Comparative studies of internal socio-political conflicts: a case study of Russia (1895-1914) and Pakistan (1950-1987)

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Historical Social Research, Vol. 16 — 1991 — No. 2, 155-170

Comparative Studies of Internal Socio-Political Conflicts

A Case Study of Russia (1895-1914) and Pakistan (1950-1987)

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Abstract: The study has the purpose to build a dynamic model which allows to make a quantitative and qualitative comparison of the socio-political tension dynamics in Russia and Pakistan in the first half of the 20th century reflected by political and economic indicators. Despite the difference between political and economic factors determining socio-political tension in Pakistan and Russia the relationship existed (in case of Pakistan more conspicuous one) between socio-political groups of factors and indicators of political stability. Apart from the purpose of adding knowledge, the approved method allows to make short-term forecasting.

Socio-political conflicts in countries with comparable stages of historical development have some similar features. If, hypothetical, this statement could be accepted, then, in order to define stricter laws, more specific proofs should be presented. For instance, a comparability of results received with the help of identical mathematical methods for the analysis of historical processes in various countries. The problem of socio-political tension (SPT) is an object of research for many scientists.(1) In the USSR these studies became possible due to some theoretical works in advance.(2) This article describes a research based on the materials concerning Russia in the early 20th century and Pakistan of 1950-1987. The analysis of SPT in Russia has revealed the retrospective forecasts* correspondence to trends in historical reality. These forecasts came true with regards to Pakistan too, since the period beginning after 1987 had shown the correctness of assessments received by calculations. This, undoubtedly, should not induce the impression that similar techniques used in the analysis of histo-

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rical material will suffice for proving the identity of socio-political processes in such polar-distance countries as Russia and Pakistan. There are, naturally, some specific features of development of the Russian and Pakistani societies. A mathematical analysis of structural ties between different factors determining the socio-political tension in Russia and Pakistan showed their specific character. The set of factors included in these two models also was different. Nevertheless, in the course of research, the relationship between socio-economic groups of factors and indices of political stability was revealed in both cases. If for Russia such relationship did exist, but in an rather indirect manner (3), then for Pakistan more close interactions between the above-mentioned factors were to be observed. This circumstance made a definite similarity of the historical processes evident. It could be interpreted as a growth of the socio-politocal tension in transitional societies making a breakthrough into an industrial society in a historically short span of time. As a rule, political instability is accompanied by uneven rates of development in different territories, cropping up of hotspots of socio-political tension, extending social stratification, the growth of radicalism and direct violence. It is likely that direct violence, overflowing into the streets during the crisis, for this situation is a typical phenomenon in the historical communities. It is worth mentioning that for each society considered in this research several critical points were revealed, which could be called peaks of instability. State structures either successfully overcame these extreme points, then followed by a more smooth, reformist stage of development, or instability in one of these points had been so great that the corresponding society entered the stage of cardinal reconstruction and thus acquired a new quality. Judging by the facts,after 1971, Pakistan managed to overcome this crisis, and political stability has now been achieved in this society. The fate of Russia, which had experienced a swift progress in 1908-1914, was quite different, and its political structure collapsed in 1917.

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While constructing a model of SPT, we used a method of indicative analysis, that is: A) considering the structure of the system »socio-political conflict« during the period of research as constant; B) selecting within the framework of the given system the subsystems which have a key importance for its functioning; choosing some elements as indicators which quite exhaustively can describe the behavior of these subsystems-blocks; analyzing these blocks as »black boxes«,that is their internal structural ties are not considered at all; C) making an assumption that the main characteristic of the SPT system is an integral indicator of socio-political tension,

moreover, supposing that the above-mentioned indicators are directly linked with the integral indicator of SPT. In order to obtain the integral indicator of SPT the following mathematical method is used, the initial linear system of equations

$$A_1 X_{11} + A_2 X_{12} + \ldots\ldots\ldots\ldots + A_n X_{1n} = F(t)_1$$

$$\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$

$$A_1 X_{j1} + A_2 X_{j2} + \ldots\ldots\ldots\ldots + A_n X_{jn} = F(t)_j$$

$$\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$

$$A_1 X_{m1} + A_2 X_{m2} + \ldots\ldots\ldots\ldots + A_n X_{mn} = F(t)_m$$

here - m n, (the system of equations is redefined), **A** - unknown parameters, **X** element-indicators (taken from the sources), **F(t)** - integral indicator, t - time (years). For **A** the most probable meanings should be found. It is believed that the most probable meanings are achieved when the sum of squares of deviations is minimal in all m levels of the initial system of equations. Thus the method of ordinary least squares (OLS) is used. If the initial equations are linear, then the demand for minimal squares of deviations leads to the system of linear normal equations, where in order to get a normal j equation, one should multiply every initial equation by coefficients of **A** and summarise all equations. By solving the normal system of equations with the dimension of $n \cdot n$ we receive the most probable meanings of **A.** Let us assume that the initial historical situation was absolutely correct reflected by **F(t)** variables, in the initial system of equations,then while solving the normal system, we would get the most probable meanings of **A.** If we substitute them in the initial system of equation we would get the coincidence of the old and the new right parts **F(t).** If the precise meanings of **F(t)** in some years were unknown (and this was the usual case),approximated meanings of some **F(t)** were taken. These meanings were chosen in the following way: they should on the whole correctly reflect the general trend of **F(t),** which is usually known. For instance, constant, linear growth, linear decrease. Of course this assumption was inaccurate, especially in some years (separate meanings of **F(t)).** OLS improved these inaccuracies, pointing to the real historical trend. In this case, having substituted the most probable meanings of **A,** received by OLS, in the initial system of equations, we got a new right part **F(t),** which in general coincided with the old one, except for those points in which the most serious deviations from the real historical situations were found. These points were considered critical. The received meanings

of A, as well as the new meanings of **F(t)** reflect the historical situation with greater probability, which was proved by solving the system with the new right part using OLS once again. The discrepancy was always minimal.

The correctness of the suggested model could be verified in the following way: as a right part (dependent variable) one of the known independent variables was taken, whose tendency to change was forecasted by the above mentioned method. Then the real and calculated meanings were compared.

The first indicator of SPT is considered to be a calculated dependence of internal political tension on time **F(t).** Of much importance are the maximums of the given dependence which are considered to be a necessary condition for the emergence of the internal political crisis-prone situation. This necessary condition should be supplemented by a number of sufficient conditions which would allow to make a comparative analysis of the crisis. Among sufficient conditions there are: the size of the space under the curve in the region of the extremum (the integral dimension of the crisis **F(t)dt),** the absolute value of the function at the extremum, which shows the acuteness of the crisis, the weights of various factor-elements of the analysed system creating the extremum. The next group of sufficient conditions was defined proceeding from the dynamics of changes in the specific weights of every factor in different crisis situations. For instance,

$$\Delta = G(t1) - G(t2),$$

where tl and t2 are the years of two extremums, G(t) - value of some factor

$$G_{ij}(t) = A_i X_{ji} \quad (4)$$

Dynamics of SPT in Russia in 1895 - 1914

You can hardly find a more dynamic two-decade period in the history of Russia that between 1895 and 1914, when the revolutionary situation for the first time in the country's history had grown into a revolution. It is these years that saw the prerequisites for the victorious February revolution and then for the triumphant October Revolution. So the interest in this period of Russian history is quite legitimate. We focus our attention on the study of the SPT dynamics and also on the development of separate elements of this system, political organizations, as well as economic factors which conditioned the growth of the social tension. Elements of the SPT model comprise the following indices: total number of those in jail annually; an average daily number of prisoners;troop engagements to aid

civilian authorities in the struggle with their own people; the size of investments allocated for supporting and developing the armed forces during the Russo-Japanese war. One of the elements of the model was the press. To characterize the evolution of this element we used the obvious fact that the number of newly edited press organs has grown with the upsurge of the revolutionary and liberal movements, while the number of periodical publications closed grew when the political reaction prevailed. As a calculation parameter the ratio of opened press organs to closed ones was taken. Chronologically, the development of the above-mentioned elements covers the whole period under research. However, the model takes also into account some elements of Russia's political structure functioning only for some periods of time considered in the present work. Naturally, they are studied only in the given period of their existence, and in the remaining years they are taken as negligible values. In March 1906 Russian trade unions were made legal for the first time. They started originating from 1905. Taking into consideration the dependence of the trade union movement's intensiveness on the scope of a class conflict, we presupposed the existence of a linear relation between the number of trade unions and the scope of a class conflict. The October Manifesto of 1905 stipulated a new element in the political structure - the Council of Ministers combining the activities of all the Ministers in Tsarist Russia. Our calculations are based on a value which is equal to a ratio between the annual number of journals issued by the Council of Ministers intended to suppress the revolutionary movement and the total number of journals. This index most clearly reflects the upsurge of the political struggle in the country. Setting the task of defining a dimensionless indicator of SPT, we assumed, as the first step of the investigation, that the level of SPT had been growing lineary from 1895 to 1913. This initial assumption was made more accurate with the help of calculations. As a result a theoretical solution was obtained, demonstrated in Fig.l and Fig.2, which show the results received under various combinations of the initial data. The general dynamics of SPT in Russia in 1895-1914 was investigated extensively in Soviet historiography (5). Its essence boils down to the fact that beginning with the mid-1890s the revolutionary-liberation movement, being permanently on the rise, had reached its peak by the early 1900s. By this time a revolutionary situation in the country gave rise to the revolution of 1905-1907. This revolution suffered from a temporary setback with political stability setting in, subsequently giving way to a fresh upsurge of a revolutionary movement in the 1910s. This rise had brought about the situation when Russia again found herself on the threshold of new revolutionary upheavels right before the First World War.

Methods applied in this work give an opportunity to demonstrate this process graphically and to supply new data.(6)

The SPT level was analyzed not only on the all-Russia scale, but also on a regional level in different goverments(gubernias) of Russia. On a broad or database, we examined in a previous publication (7) the level of SPT in 52 European governments of Russia. (A cluster analysis that gave an opportunity to draw a map of SPT level.) The estimates testify, in particular, to the growth of SPT in almost all governments from 1901 to 1910, which confirms the correctness of the earlier assumption concerning the SPT increase in the given period of time (initial level).

Dynamics of SPT in Pakistan in 1950-1987

The history of Pakistan from its inception till the present days was permanently characterized by dynamic processes in the foreign as well as domestic policies. Change of political leaders, high level of internal strife, division of the country, wars - all this makes the case of Pakistan very attractive for researchers keen on building a dynamic model of SPT.

This model is more expedient since Pakistani political development could hardly be analyzed by traditional methods and forecasts.(8) These difficulties are conditioned by other reasons. First, a weak institutionalisation of political life; second, a conflict-prone domestic political process. These two factors determine a considerable role of the subjective influence in the history of Pakistan. Despite of the significance of the subjective factor, it cannot degrade the importance of the search for objective prerequisites of the SPT growth in the country. The database used in this paper for the development of SPT in Pakistan has an objective character and is not connected with any particular leaders of this country. That is why the model built on this database (built from official Pakistani statistics) makes it possible not only to recreate a graphic picture of Pakistani internal political situation and a retrospective forecasting of the SPT dynamics, but also to make a short-term forecast.

Low living standards of the majority of the Pakistani population are one of the main reasons behind the interaction of economic and political factors, the interaction which has a direct impact on moulding the SPT in the country. It could surely be said that not only low living standards, but a weak institutionalization in political life were often reasons for a high level of violence and sometimes determined a rather conspicuous role of a personal factor. During economic crises all those circumstances aggravated contradictions between the traditional and modern economic sectors and increased internal political instability in general. Taking into account a close interaction of economic and political processes in Pakistan in the 1950s-1980s, the interaction quite often determining this or another level of SPT, we did not lose sight of the possibility of these processes lagging

behind or outstripping with relation to each other. To describe the method of thos research: first, a separate study of Pakistan political and economic processes, second, a comparison of the data obtained and finally drawing conclusions on the basis of this comparison. Moreover, the authors expected to obtain such results of research that would allow, first, to represent the dynamics of SPT graphically as a chart of indicators, secondly, to make a comparative quantitative analysis of crisis-prone situations, i.e. to outline one of the possible variants of the typology of critical situations and, thirdly, to make a short-term forecast for the political situation in the country.

An integral indicator of SPT in Pakistan for the period under survey is a result of interaction of the contradictions objectively existing in this country. These contradictions are manifest through the following phenomena: mass instability, institutional instability and the military-political tension. In detail: 1) Mass instability. Taking into account the low threshold of the use of force in internal conflict in Pakistan, we came to the conclusion that the number of killed people in political strife could serve as an indicator of the level of mass instability. The growth of the number of victims by one order could serve as a »step« in expertise. 2) As an indicator for institutional instability we introduced the presence of forced reshufflings in the upper echelons of power. This choice is based upon Pakistan historical records. It is typical for the country that the alteration of temporary stability and instability periods lead to the replacement of leaders and groupings with the essence of power being stable. There were also some crucial stages when the replacement of charismatic leaders was accompanied by changes of the regime. 3) Military-political tension. It is characterized by combat deployment or combat engagement of armed forces. The minimum level of military unit we took into consideration was a battalion with lower levels of units engaged being handled as background accidents. For every element-indicator we introduced five levels characterizing instability or tension. These are: a) absence of instability, b) significant instability, c) high instability, d) acute instability, e) critical instability. The quantification of the three SPT indicators shows the following pattern:

levels	mass instability	institutional instability	military-political instability
a	less than 10	forced reshuffling absent	background clashes with less than a battalion of troops engaged
b	lOx	replacement of single influential personalities	clashes on the border involving up to a brigade, or combat deployment of up to a division

c	100x	replacement of separate groupings	local military actions involving up to a division or combat readiness of up, to a corps
d	1000x	change of a cabinet or a charismatic leader	a theater war, with combat actions of not less than a corps, with all the, armed forces staying alert
e	more than 1000	change of a regime with its social values	a total war with all the armed forces engaged, the existence of the country is at stake

This chart was presented as a basis for expert appraisal for specialists on Pakistan of the Institute of Oriental Studies of the Soviet Academy of Sciences. They estimated the characteristics for each year in the period from 1950 to 1987. Their estimates were summed up and used as a database in this research. The problem of choice of economic indicators determining the potential possibility of SPT emergence in Pakistan (hereinafter SPTec) was solved in the following way. Following the method of indicative analysis of SPT described above, we avoid any specific study of the particular factors and the overall economic stability per se. Our purpose was to empirically select such indicators that would indirectly reflect a change of the political situation at various time points. At the initial stage 15 indicators were taken in the form of statistical rows for each year of the period under study. As a result of the correlation analysis the following seven indicators were selected:

1. Per capita growth of the national income in %
2. Growth of volumes of retail and wholesale trade in %
3. Growth of production in large industry in %
4. Growth of Gross National Product in %
5. Growth of the overall volume of foreign loans and credits,%
6. Growth of loans and credits from the USA in %
7. Growth of loans and credits from the USSR in %

For the analysis the rows were transformed from absolute figures into annual increments and subsequently into a weighted mean values. These economic indicators were included in the model for determining the level of the SPTec. As an initial hypothesis the linear dependence between SPTec and the given indicators was assumed. It is noteworthy that unlike the SPT indicators depicting instability this SPTec indicator estimates the opposite category - potential stability, and shows the potential possibility of an SPT change under the influence of economic factors. As an initial condition for our research in both cases SPT and SPTec - we defined **F(t)**

as a constant for the period from 1950 through 1987. Furthermore this rough assumption was corrected by the above-mentioned method of indicative analysis. The system of equations in both cases consist of 38 units, one unit per year. The right part of the equations comprises a dependent variable **F(t),** taken from initial conditions, the left part contains independent variables (ele tions was a new function **F(t),** where t stands for time.

We also tried to apply other methods of multidimensional quantitative analysis, in particular the methods of automatic classification of objects. Within the framework of this study each year was considered to be a cluster consisting of a number of elements. Cluster analysis in this case measures the mathematic distance between years-objects in the space of traits SPT and between years-objects in the space of traits SPTec. To define the distance between a pair of points the so-called Euclidean distance was used. The method of agglomerative-hierarchial cluster analysis was applied which allows to solve the following problems. First, to verify the results obtained with the help of the method of indicative analysis; second, to distribute all the years-objects under study into cluster groups, which provides an opportunity to define the typology of crisis and stability situations.

The forecasting capabilities of this method are somewhat modest, confining mostly to a short-term prognosis. The databank of events from 1950 to 1987 allows to compare indices characterizing the SPT levels of the past years with the present situation. As a result of clusterisation the current year may be placed in a cluster together with some other years with the same level of SPT. Since we know the actual events of that years in the past, we may predict then considerable accuracy the future developments in a short-term perspective.

* * *

Before modelling the integral indicator of SPT, we calculated some correlations.

Pairs of Factors	Coefficient of correlation
mass instability and institutional instability	+ 0,58
mass instability and military-political instability	+ 0,18
institutional instability and military-political instability	0,14

These data confirm the weak interaction between the factors chosen for defining SPT. Computer calculations of the integral dimensionless indicator SPT for Pakistan brought about the following results represented in graphic form in Fig.3. In table form the results are presented in the appendix. As initial condition for the integral indicator a constant was taken (const= 1). The values considerably different from this level are extremal points of the obtained function. The following is an analysis of eight peak points of the given chart: four of them - 1954, 1958, 1965 and 1969 - are from the period prior to the emergence of Bangladesh, and 1971, 1977, 1983 and 1986 belong to the period of present day Pakistan. During the first period a trend dominates which shows the growth of SPT up to 1954, then a recession by the early 1960s, and again a new considerable growth by the turn of the 1970s.

No cyclycal regularity of extreme figures could be traced which would allow to define the terms of emergence and the amplitude of new peak loads. It can probably be explained by the fact that the system of internal political interactions in Pakistan prior to 1971 was disharmonious, because it lacked the mechanism of self-regulation, as a result - this system had started to desintégrate a long time before. The second period began after 1971, the dynamics of SPT is presented as a rather orderly phenomenon with some cyclical regularities. While the general trend shows a tendency to a gradual recession of SPT, another regularity could be revealed: the amplitude of oscillations decreases at the reductions of intervals between the peak points of the chart. Indeed, four peakpoints within the second period have the following values of SPT: 1971 -, 1.930,1977-1.681,1983-1.400, 1986 - 1.071. (The initial value of SPT - on the basis of initial conditions - was equal to 1. See Fig.3.) Intervals between these points are six, six and three years respectively. We assume that the function SPT may serve as a foundation for formulating the following hypothesis of a logical-intuitive character: in a long term perspective Pakistan tends to become a self-regulative political system. For this system some activation of political life is typical, according to minor extremal values of SPT. The general trend of SPT points to a decline and, possibly, the stability of the political system will be achieved on a qualitatively new level, i.e. not due to severe dictatorship and suppression of opposition but on the basis of a free balance of political forces. On the whole, the SPT chart (Fig.3) in a long-term perspective could be described as a chart of damped oscillations around a trend towards a diminished SPT. In 1988 we observed a peak of instability occurred just two years later than the previous one, and the level of this peak does not exceed that of 1977. Subsequent events corroborate the conclusion that periods between peak values of SPT are becoming shorter and with a lowers amplitude.

The results of cumulations of SPTec are presented in Fig.4 and in the appendix keep in mind that the indicator SPTec is an indicator for pro-

spenity. The peaks on the chart (Fig.4) testify to the years of favourable economic conditions unlike the chart of SPT (Fig.3).While analyzing the chart we must take into account that for initial conditions a direct line (const = 1) was taken. Consequently, regions of the chart above this level are considered to be periods of stability of SPT, and those below are corresponding to the years of instability.

An interpretation of the graph shows, that the 1950s were marked by economic instability, while the 1960s were mainly years of well-being. The year 1971 had a minimal value of SPTec. The period when Bangladesh became indépendant can be strictly put into a phase of economic failures under the Bhutto regime (the trend stagnated on a level below »of«) and a period of stability under the Zia Ul Khak administration. While considering the dynamics at great intervals we may notice some similarity between the behavior of SPT and SP. Particularly it is connected with the general increase of stability in the last part of both charts. For instance, in both cases we see the lowering of amplitudes of oscillation. On the whole in the case of Pakistan we may describe it as a correlation between political and economic factors. The indicator SPTec quite adequately reflects the main part of Pakistan's political history. The first deep recession of SPTec was observed in 1957-58 and in 1958-59 fiscal years. (Economic data are indicated by the first half of a fiscal year,i.e. 1957 means 1957-58.) This period was marked by the crisis of power and the coup of Ayub Khan in 1958. It is significant that before this coup of SPTec decreases and afterwards - it increases with consequent stabilization. Furthermore, the absolute peak of political tension in the case of Pakistan's history - 1971 - coincides with an absolute decline of SPTecin in 1971. The indicator graphically reveals the accumulation of negative phenomena in the economy during 1973-74 and 1977-78 reaching its minimum at the time of the military coup of 1977. This is the third major recession of economic stability in the history of Pakistan which not only facilitated to a great extent the overthrow of Bhutto's regime but also induced a subsequent support to the military regime by the Pakistani elite. Right after the coup the economic situation improved, as the indicator SPTec demonstrates: from 0.53 in 1977-78 to 1.14 in 1978-79. The only major rise of political tension under Zia Ul Khak's administration in 1983 is accompanied by some decline in economic stability in 1982-1983 from 1.31 to 0.93 but rising again the next year. Thus the indicator SPTec reflects actually all meaningful peaks of political tension after the mid - 1960s. This testifies to the adequatness of methods of mathematical processing, as well as to the correct choice of economic indicators.

As mentioned, before the general trend of SPTec corroborates the conclusion about the relative stabilization of Pakistans political situation after 1971. Meanwhile we should note that a short decline of economic situation

in Pakistan does not entail automatically stronger political tension and economic stability does not exclude hazardous decisions leading to SPT splashes. Evidence of the first tenet is the period of Bhutto's rule in the early 1970s when economic instability had been accumulated during five years before it switched on the mechanism of political instability. Corroboration of the second tenet is the foreign-policy crisis of 1965 when combat operations were started by Pakistan in the period of a rather high amplitude of SPTec. These results based on the indicative method, should be supplemented using cluster analysis. We considered the coincidence or closeness of several years characterized by different paramètres taken from the data, and paid special attention to the crisis or pre-crisis years. Clusters characterizing political tension were to be found.(9) As a selection.

Years united in clusters	Distance between clusters	Chracteristic of the situation
1957, 1968, 1976	0.29	Years prior to the change of the regime
1953, 1970	0.48	Years prior to a crisis
1972, 1978	0.89	Post-crisis rehabilitations of stability
1958, 1969, 1977	1.01	Change of regime against deep crises
1965, 1971	8.60	Crisis conditioned by outer threat

Unlike rather distinct results of the cluster analysis of political indicators, clusters of economic situation represent groups combining crisis and pre-crisis points:

Years united in clusters	Distance between clusters	Characteristc of the situation
1957-58, 1971	1.20	Pre-crisis and crisis, situations against the background of economic recession
1958-59, 76-77	1.77	Change of regime and pre-crisis situation
1970-71, 83-84	2.69	Inter-crisis situation and growth of mass, instability

A comparison of the results of cluster analysis of political and economic indicators in the case of Pakistan can revealrelative reliability of the applied methods as far as short-term forecasting is concerned.

Conclusions

This study was an attempt to build a dynamic model which allows to make a quantitative and qualitative comparison of SPT dynamics in Russia and Pakistan reflected by political and economic indicators. Despite the difference between political and economic factors determining SPT in Russia and Pakistan, the relationship existed (in case of Pakistan more conspicuous one) between socio-economic groups of factors and indicators of political stability. Apart from the purpose of adding knowledge, the approved methods allow to make short-term forecasting. This forecasting is possible on the basis of the indicative method and cluster analysis. It can be carried out proceeding from trends and amplitudes of oscillations of the SPT indicator (indicative method) and comparing the results obtained from a historical database with the current events (cluster analysis).

Appendix

Table of values of integral indicators of political tension (SPT) and economic stability (SPTec.)

Year	SPT	SPTec
1950	0.15	0.87
1951	0.32	0.89
1952	0.82	0.99
1953	1.16	0.87
1954	1.37	1.02
1955	0.42	0.61
1956	0.52	0.68
1957	0.72	0.35
1958	0.88	0.48
1959	0.17	0.62
1960	0.37	1.24
1961	0.24	1.21
1962	0.51	1.31
1963	0.37	1.14
1964	o.40	1.21
1965	0.86	1.01
1966	0.54	1.14
1967	0.56	0.84
1968	0.72	0.99
1969	1.69	1.06
1970	1.08	0.89
1971	1.93	0.24

1972	1.15	1.08
1973	1.58	0.95
1974	0.45	0.56
1975	0.41	0.62
1976	0.92	0.67
1977	1.68	0.53
1978	1.01	1.13
1979	0.87	1.05
1980	0.58	0.89
1981	0.53	1.31
1982	0.70	0.93
1983	1.40	1.31
1984	0.46	1.27
1985	0.78	
1986	1.07	
1987	0.49	

Notes

1. This work was supported by a research grant from the German »Alexander von Humboldt-Stiftung«.
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10. In detail about this method see in: Grekov, B., Shatsillo, K., A Quantitative Approach...

Fig. 1. Indicator of SPT in Russia

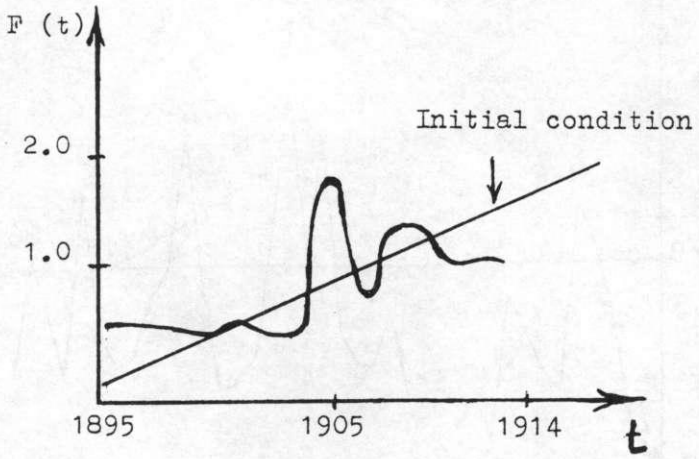

Fig. 2. Indicator of SPT in Russia.
Various Cominations of Initial Data

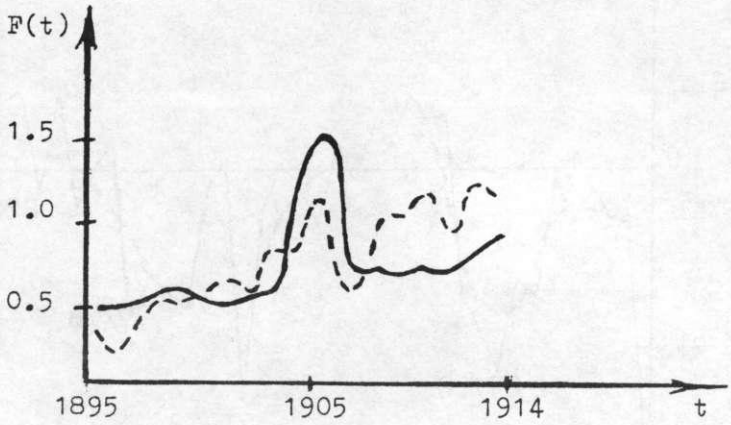

Fig. 3. Indicator of SPT in Pakistan

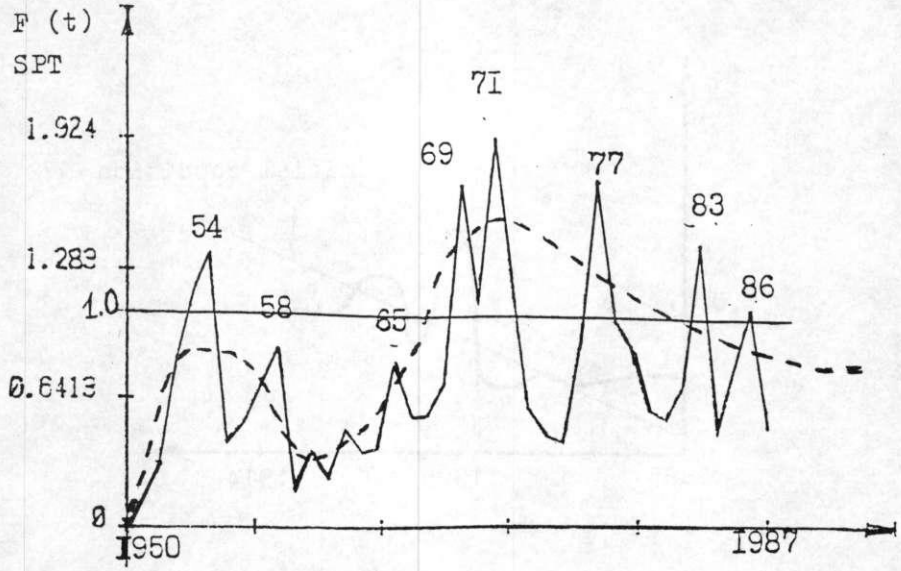

Fig. 4. Indicator of SPTec in Pakistan